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Metaphysical and Moral Status of Cryopreserved Embryos

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Abstract

Those who oppose human embryonic stem cell research argue for a clear position on the metaphysical and moral status of human embryos. This position does not differ whether the embryo is present inside its mother's reproductive tract or in a cryopreservation tank. It is worth examining, however, whether an embryo in "suspended animation" has the same status as one actively developing *in utero*. I will explore this question from the perspective of Thomas Aquinas's metaphysical account of human nature. I conclude that a cryopreserved human embryo counts, both metaphysically and morally, as a *person*; and thus the utilization of such embryos for inherently destructive research purposes is impermissible.

Introduction

Those who oppose human embryonic stem cell research, such as the Roman Catholic Church, argue for a clear position on the metaphysical and moral status of human embryos. This position, moreover, does not differ whether the embryo is present inside its mother's reproductive tract or in a cryopreservation tank. Germain Grisez represents this view:

The frozen embryo truly is a tiny baby. Even though this baby should not have been brought into being as he or she was,¹ now that this new person exists, he or she—like a baby conceived as a result of fornication,

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adultery, rape, or incest—has the same immeasurable worth and deserves the same respect and loving care as every other human being.²

The question is worth exploring, however, of whether the metaphysical and moral status of a “frozen” embryo is indeed the same as one living *in utero*. One phrase used to describe the status of a cryopreserved embryo is “suspended animation.” The use of this phrase has metaphysical import insofar as “animation” is derived from the Latin word for “soul”—*anima*—as used by Thomas Aquinas and other Christian medieval philosophers. Does cryopreservation thus involve “suspending” the soul? What would this entail with respect to a frozen embryo’s nature a human “person”? I will explore these questions from the perspective of Aquinas’s metaphysical account of human nature. I will briefly elucidate what Aquinas’s account entails concerning when a typical human embryo is first “ensouled”—and thereby becomes a person—and whether a cryopreserved embryo is similarly ensouled. The determination of whether a cryopreserved human embryo is in the metaphysical category of “person” is foundational to the question of its moral status.

Thomistic Account of Human Nature and Embryogenesis

According to Aquinas, all human beings are *persons*.³ He adopts the definition of personhood developed by Boethius: “An individual substance of a rational nature.”⁴ The disposition of a human body is determined by its having a *rational soul* as its “substantial form.”⁵ As a substantial form, a rational soul is responsible for the existence of a human being, the actualization of the matter that composes a human being, and the unity of existence and activity in a human being.⁶

One way to understand the notion of a rational soul as a substantial form, in contemporary terms, is to think of it as a “principle of organization” for a human body. A human

body is an “organic” construct. It has a variety of parts that both operate independently and function collectively to support the existence and activity of a living, sensing, and thinking being—a rational soul thus has vegetative, sensitive, and rational capacities. Both the independent operation of one of a body’s organs, and its functional unity with the body’s other organs, are governed by the formal, or *functional*, unity of the organism itself.

A human being is not identical to either her rational soul or the matter it informs. Rather, a human being is *composed* of her informed material body. Aquinas concludes, “A human being is said to be from soul and body just as from two things a third is constituted that is neither of the two, hence a human being is neither soul nor body.”⁷

This general metaphysical account of human nature raises the specific question of when a human being first comes into existence.⁸ Aquinas’s explicit account of human embryogenesis has been generally rejected by contemporary scholars due to its dependence upon medieval biological information, which has been far surpassed by current scientific research. A number of scholars, however, have attempted to combine Aquinas’s basic metaphysical account of human nature with current embryological data to develop a contemporary Thomistic account of a human being’s beginning.⁹

Aquinas argues that an embryo or fetus is not a human being until its body is informed by a rational soul. Aquinas holds that a soul’s capacities to perform its definitive operations—whether life, sensation, or rational thought—is necessary for it to exist.¹⁰ The actualization of such capacities, however, is *accidental*—i.e., not essential—to the soul’s existence.¹¹

Of course, a developing human embryo or fetus, and even a newborn infant, does not actually perform all the operations proper to a human being, including rational thought. Nonetheless, Aquinas denies that this lack implies that a rational soul does not inform a

developing human embryo, fetus, or newborn infant. All that is required for a rational soul to be present, and thus for a human being to exist, is a human body with the capacities for a rational soul's proper operations.¹² The basic metaphysical principle Aquinas employs in his account of embryogenesis is that a rational soul does not inform a physical body unless the body is properly disposed for that type of soul.¹³

Applying this Thomistic metaphysical principle, Benedict Ashley argues that a human zygote—the fertilized ovum that is the immediate product of conception—is a human being with all the proper capacities for life, sensation, and rational thought. As evidence of this, Ashley cites the fact that a human zygote contains the *epigenetic primordia* of the biological structures proper to a human being; for example, from the zygote will eventually be formed the “primitive streak,” from which the brain and nervous system will develop.¹⁴ Ashley further points to a zygote's DNA-filled nucleus as the “control center” that regulates embryonic biological functioning, such that a zygote is a unified, individual substance from fertilization onward.¹⁵ This supports the conclusion that a one-celled human zygote, and *a fortiori* the embryo and fetus into which it develops, is informed by a rational soul and is thereby a human *person*.¹⁶

Metaphysical Implications of Cryopreservation

The extreme conditions—both internal and external—that characterize a cryopreserved embryo can cast doubt that such an embryo, unlike a normally developing human embryo *in utero*, is rationally ensouled and thereby a person. Nicholas Tonti-Filippini summarizes the unique condition of cryopreserved embryo:

My argument goes to the nature of chemically anhydrating embryos, replacing water with a cryoprotectant such as glycol, and super freezing at temperatures at which no life has been known to survive. This is a state in

which the parts of the embryo are no longer in an integrated relationship: all biological activity is interrupted, and the parts are separated by the chemical solution.... Frozen and anhydrous storage is a state of suspended animation, of life, as it were, arrested.¹⁷

But in a frozen-anhydrous state all activity ceases. The parts of the embryo are separated by the chemical solution and, in that state, the parts of the whole do not relate to one another in any physiological sense except perhaps by being related spatially. The separating effect of the chemical solution and the effect of super-freezing means that the embryo is not integrated or dynamic in the way in which we normally consider to be essential to being a living organism.¹⁸

As described, Aquinas defines a human person as a rationally ensouled human body—the rational soul being responsible, as the *form* of the body, for the body’s existence and nature as a living, sentient animal capable of rational thought. I further contend that, from the Thomistic metaphysical viewpoint, it is most reasonable to conclude that a human embryo is informed by a rational soul from conception onward—that is, once its integrated, organic life functions commence and development toward eventual human adulthood ensues. But, in the case of a cryopreserved embryo, its integrated, organic life functions cease once the cryoprotectant separates the embryo’s parts, which were previously integrated and able to function collectively through the medium of water.

Nevertheless, a cryopreserved embryo is “alive in the sense that it could be thawed so that life development could continue”¹⁹:

[A cryopreserved embryo] can be re-integrated through the removal of the cryopreservative, rehydration, and thawing. Dynamism can be restored by that process. He or she is therefore not dead; there is a possible future. Death, by contrast, is a permanent state. These embryos can be restored to an integrated state and to activity and development.²⁰

Tonti-Filippini refers to such an embryo as having a “quasi-living existence.”²¹ In accordance with the “benefit of the doubt” that Tonti-Filippini recommends giving to cryopreserved embryos, and based on the Thomistic account of embryogenesis described, I conclude that there is every reason to assert that a cryopreserved embryo is indeed, substantially speaking, a living organism informed by a rational soul—a human person:

A frozen embryo is not dead—it is still alive. Its metabolic rate only suffices to preserve its potential for sustaining life, not for development or growth. This represents a case of self-preservation or suspended animation while life is dormant. The live embryo that survives thawing is the same ontological embryo that underwent the freezing process. The frozen embryo is re-activated once it is thawed.²²

Although the definitive activities that characterize a living human organism are not present while an embryo is cryopreserved, the intrinsic *potential* for the embryo to exhibit such activities is present nonetheless.

One may question at this point what type of potentiality characterizes a cryopreserved embryo’s life functions. Stephen Hanson argues that the potentiality of a cryopreserved embryo is categorically different from that of an *in vivo* embryo:

A frozen embryo will not become an adult human being without significant external interference. It is not actively developing towards any future state.... In its frozen state, the embryo will not grow, develop, or change at all over time. It is not dynamic. Its lack of active potential is not merely a matter of its chances of being selected and successfully implanted; its developmental process has been “switched off” by the freezing process, and cannot recommence without a significant change in the embryo’s status.²³

Aquinas distinguishes between two types of potentiality: *active* and *passive*. If a substance, such as a typical human embryo, has per se an active potentiality for the definitive activities of a human person—life, sentience, and rationality—then it is informed by a rational soul. In contrast to an active potentiality, something has a passive potentiality if it can be the subject of externally directed change such that it can become what it is not already. Hence, if a substance, such as a sperm or ovum, has only a passive potentiality to become a substance that has an active potentiality for such activities, then it is not yet informed by a rational soul—it is not yet a human person.²⁴

Furthermore, active potentiality comes in two varieties. The first is what Robert Pasnau refers to as a “capacity in hand” to perform an operation, which means that no further development or significant change is required for the potentiality to be actualized.²⁵ For example, a person may have a capacity in hand to speak Spanish if, for example, she had majored in it in college; but it may be the case at any one moment that she is not using this capacity, and so it is not in actual operation, which it would be if she were actually speaking Spanish at that moment. The second is what Norman Kretzmann refers to as a substance’s “natural potentiality” to develop a capacity in hand to perform an operation.²⁶ For example, before having learned

Spanish and thus developed a capacity to do so, a person would have a natural potentiality to develop this capacity, as opposed to a dog or a plant that lacks such a natural potentiality. Any human person is born with an innate cognitive architecture that allows her to acquire a language, Spanish or otherwise²⁷; other sentient animals apparently lack such cognitive architecture. Of course, actualizing a human person's natural potentiality for language acquisition requires external input—textbooks, teachers, exposure to native speakers, etc.—but the natural potentiality itself must be *active* if such input is to be effective; and while the actualization of this potentiality may alter a person from being a non-Spanish-speaker to being a Spanish-speaker, it does not alter her essential nature as a human person with a natural potentiality to acquire languages such as Spanish. Any natural substance has numerous natural potentialities as defined by its essence, some of which may be developed into capacities in hand while others are left undeveloped.²⁸

Because a substance possesses its essential set of active potentialities by virtue of its substantial form, which is also what grounds a substance's persistent numerical identity,²⁹ it follows that 1) something that has an active potentiality for the definitive activities of human persons *already* possesses the essential nature definitive of personhood, and 2) something that lacks such a potentiality, even though it may have the passive potentiality to obtain it, does *not yet* possess the nature of personhood and thus must undergo a change in both specific and numerical identity if it is to become a person.³⁰

Active potentiality refers to something's capacity to *be* in a certain way, as opposed to merely the possibility of its *becoming* something.³¹ For example, a sperm or ovum would possess the relevant active potentialities definitive of personhood only if it could come to actualize those potentialities while preserving its numerical identity—i.e., it remains the *same* substance

identical with itself throughout its development from a germ cell to an actually self-conscious and rational person. A change, however, from a germ cell to a person does not appear to be an identity-preserving transformation: a sperm loses its substantial identity when it fuses with an ovum, and vice versa, to form a new substance—an embryo.³² The only sense in which a germ cell may plausibly be called a “potential person” is in the weak sense that it provides the *makings* of a person.³³

Given this distinction, it may seem that we ought to conclude that a cryopreserved embryo has only a passive potentiality to engage in definitive human activities. The primary reason a sperm or ovum has only a passive potentiality in this regard is due to the fact that each requires something external to itself to change it such that its very nature is altered as it takes on new capacities for different types of activities—an ovum which does not have per se a capacity for sentience or rationality gains such capacities once its haploid genome is complemented by the haploid genome provided by the sperm that fertilizes it. By the same token, a cryopreserved embryo requires something external to itself, an IVF technician, to change it—by removing the cryopreservative, rehydrating it, and thawing it—such that it can develop into a fully actualized human person. The difference, however, between an ovum’s dependence on a sperm cell and an cryopreserved embryo’s dependence on an IVF technician is that an ovum’s nature is *altered* in the process of fertilization from being a merely living cell to a dynamically integrated, living organism capable of developing faculties of sentience and rationality. A cryopreserved embryo, on the other hand, does not suffer a change in its nature, but rather a *restoration* of the capacities for growth and development it had prior to being anhydrated and frozen. Its nature as a human embryo remains the same from conception, through cryopreservation, to thawing and implantation.

Admittedly, the claim that a cryopreserved embryo's nature is "restored" when it is thawed, rather than it being "altered" by the freezing process and then changed back, appears question-begging *prima facie*. However, there are at least two reasons supporting this conclusion. First, the fact that the cryopreservation process does not permanently destroy an embryo's capacity to develop into a fully actualized human person is evidence that something essentially "human" remains in the cryopreserved embryo such that it is not able to become a different type of being once it is thawed—it will either become a fully actualized human person or it will die. Although the water that is artificially removed is certainly essential to the embryo's—and later the adult's—organic functioning, the mere fact of cryopreservation with successful reversal evidences that such water is not essential to the embryo's substantial existence. Although the water is intrinsic to the embryo, is part of its nature, and is necessary for it to function as a living organism, the water is not essential for the embryo's very existence given an effective artificial substitute.

Of course, sperm and ova share a similar fate of either becoming a fully actualized human person—if conception occurs—or dying after ejaculation or menstruation. As argued previously, however, we have good reason to regard a human embryo, prior to cryopreservation, as having an intrinsic active potentiality—as opposed to the passive potentiality possessed by sperm and ova—to develop into a more fully actualized human person. While it is arguable that cryopreservation reverts the embryo's active potentiality into a passive form, such an occurrence would involve a *substantial change* in which a nascent human person dies, her organic parts are preserved, and—if thawed—is restored to what would be a numerically distinct existence. This leads us to the second argument.

We can differentiate the relevant potentialities of the different types of entities under discussion thus: 1) A sperm cell or ovum has merely a passive potentiality to develop into a person because a) each must be changed by an external agent—the other gamete—in order for such development to occur, and b) such change is not identity-preserving—each gamete ceases to exist in the process of fertilization; 2) an intact embryo, existing either *in vitro* or *in utero*, has an active potentiality to develop itself—within a supportive environment³⁴—into a more fully actualized self-conscious and rational person; 3) a cryopreserved embryo, while not actively developing itself, nevertheless retains the *natural potentiality*—a form of active potentiality sufficient for rational ensoulment—to develop itself if successfully thawed and implanted. A cryopreserved embryo thus has a *mixed* potentiality: It must passively receive external assistance, but such assistance is only effective due to the embryo's intrinsic natural potentiality—analogueous to a human infant's natural potentiality to passively receive external data that helps her to learn language.

Second, the age-old principle of Ockham's razor applies equally well in metaphysics as it does in empirical science. In this case, on the Thomistic understanding of human nature, an extraordinarily more ontologically complex alternative awaits the denial of the claim in question. This alternative would involve the claim that a human embryo dies through the cryopreservation process—presumably once the essential water medium is removed—and then is “reanimated” when the embryo is rehydrated and thawed. Given the Thomistic conclusion that a human embryo is rationally ensouled from conception onward, regardless of whether conception occurred naturally *in utero* or artificially *in vitro*, one must conclude on this picture that the embryo's rational soul separates from its body after the water is removed and the soul persists in a disembodied state while the embryo is cryopreserved.³⁵ Once the embryo is successfully

thawed, one of two events would occur: either the same rational soul re-informs the now living embryonic body, or a new soul informs the embryo since it is arguably a different substance than it was prior to being frozen. Neither of these options is attractive given the more ontologically simple picture above, which involves an embryo's rational soul continuing to inform it—albeit in a *quiescent* state—until the embryo returns to a condition in which the soul's capacities for life and, after a period of further development, sensation and rational thought may be actualized once again.

It may be objected that such discontinuous existence is not metaphysically problematic at all, and I agree that there is nothing inherently problematic about an embryo ceasing to exist, her parts being preserved, and then those parts coming to compose a numerically distinct embryo. It is, nonetheless, an *inelegant* picture that should not be preferred—absent prior ontological presuppositions—to a competing explanation that satisfactorily accounts for an embryo's persistent numerical identity throughout this procedure. And while it is true that the embryo's *life functions* have (temporarily) ceased, it does not necessarily follow that the *embryo itself* has ceased to exist, so long as we have reason to believe that the embryo's intrinsic active potentiality to engage in such functions again and develop into a more fully actualized person remains, as I have argued. Thus, as Steven Luper contends,

Instead of saying that, in the case of ... frozen embryos, an organism's *life* has been suspended or temporarily ended, let us instead say that its *vital processes* have been temporarily suspended, and that it remains alive when these stop. This is appropriate, because an organism whose vital processes are suspended for a time still has, during that time, the *capacity*³⁶ to maintain itself, just as a sleeping person retains the capacity for consciousness.... These reflections suggest that

something dies not when its vital processes are suspended, but rather when its capacity to maintain itself through its vital processes (which remain even while in suspended animation) is destroyed.³⁷

Conclusion—Moral Status of Cryopreserved Embryos

A human embryo's *moral* status, from the Thomistic perspective, whether it is developing *in utero* or is frozen, follows from its metaphysical status as a person. A human person has a fundamentally intrinsic value due to being a living, sentient, and rational substance. Rationality, on Aquinas's view, is the highest capacity found among natural substances because it enables a person to come to know universal conceptual truths and to determine their own actions.³⁸ Hence, he says, the term "person" is attributed to rational beings insofar as they have a special *dignity*—i.e., a particularly high degree of intrinsic value among natural substances.³⁹ Life, Aquinas further contends, is a fundamental good for a human person.⁴⁰ Without life, none of a human person's other inherently valuable capacities—including rationality—can be actualized in the service of contributing to the overall goodness of the natural world in which human persons exist and flourish. To act against the existence and flourishing of a human person thus constitutes a morally impermissible act that must be avoided due to the ethical mandate not to destroy, injure, or impede life as a fundamental good.⁴¹ This conclusion, of course, bears on the moral permissibility of human embryonic stem cell research. So long as such research involves harm or destruction of human embryos, regardless of whether they are conceived in vitro and cryopreserved, it violates such embryos' fundamental moral status as *persons*.⁴²

¹ Grisez is referring to the Church's moral stance against in vitro fertilization (IVF).

² Germain Grisez, *The Way of the Lord Jesus*, vol. 3, *Difficult Moral Questions* (Quincy, IL: Franciscan Press, 1997), 240. Cf. William E. May, "On 'Rescuing' Frozen Embryos," *National Catholic Bioethics Quarterly* 5 (2005): 53.

³ See Thomas Aquinas, *Summa theologiae* I, q. 16, a. 12 ad 1. The general metaphysical account that follows is taken from Jason T. Eberl, "Aquinas on the Nature of Human Beings," *Review of Metaphysics* 58 (2004): 333–365.

⁴ Aquinas, *Summa theologiae* I, q. 29, a. 1. Cf. Boethius, *Contra Eutychen et Nestorium*, III. All translations of Aquinas's texts are my own.

⁵ Following Aristotle, Aquinas defines a "rational soul" as a soul that has the relevant capacities for life, sensation, and rational thought and as the type of soul proper to the human species. A "sensitive soul," on the other hand, has the relevant capacities for only life and sensation and is the type of soul proper to all non-human species of the animal genus. A "vegetative soul" has the relevant capacities for life alone and is proper to all non-animal living organisms. See Aristotle, *De anima*, 414a30–415a14.

⁶ See Thomas Aquinas, *Summa contra Gentiles*, bk. II, ch. 68; *Sententia libri De anima*, bk. II, lect. 2.

⁷ Thomas Aquinas, *De ente et essentia*, ch. II. Cf. Aquinas, *Summa theologiae* I, q. 75, a. 4.

⁸ What follows is derived from Jason T. Eberl, "Aquinas's Account of Human Embryogenesis and Recent Interpretations," *Journal of Medicine and Philosophy* 30 (2005): 379–394.

⁹ The views of these scholars are discussed in *ibid.*

¹⁰ See Thomas Aquinas, *Quaestio disputata de anima*, a. 12, ad 7.

¹¹ See Aquinas, *Quaestio disputata de anima*, a. 12.

¹² See Aquinas, *Summa contra Gentiles*, bk. II, ch. 59.

¹³ In his explicit account of human embryogenesis, Aquinas, following Aristotle, contends that such a body does not exist until the time of "quickening," which occurs forty days after conception if it is male and ninety days after conception if it is female. See Thomas Aquinas, *Scriptum super libros Sententiarum*, bk. III, dist. 3, q. 5, a. 2; Aristotle, *Historia animalium*, 583b3–5. There are obvious scientific reasons for rejecting Aquinas's particular conclusion here, although the metaphysical principles he employs arguably remain sound.

¹⁴ See Benedict Ashley, "A Critique of the Theory of Delayed Hominization," in *An Ethical Evaluation of Fetal Experimentation: An Interdisciplinary Study*, eds. D. McCarthy and A. Moraczewski (St. Louis: Pope John XXIII Center, 1976), 124.

¹⁵ See Ashley, "A Critique of the Theory of Delayed Hominization," 123; Benedict Ashley and Albert Moraczewski, "Cloning, Aquinas, and the Embryonic Person," *National Catholic Bioethics Quarterly* 1 (2001): 197.

¹⁶ Ashley and Moraczewski, "Cloning, Aquinas, and the Embryonic Person," 199–200. For similar arguments for this conclusion, see W.J. Bracken, "Is the Early Embryo a Person?" *Linacre Quarterly* 68 (2001): 49–70; Renée Mirkes, "NBAC and Embryo Ethics," *National Catholic Bioethics Quarterly* 12 (2001): 163–187; T. De Koninck, "Persons and Things," in *Recovering Nature: Essays in Natural Philosophy, Ethics, and Metaphysics in Honor of Ralph McInerney*, eds. T. Hibbs and J. O'Callaghan (Notre Dame, IN: University of Notre Dame Press, 1999); Mark Johnson, "Delayed Hominization: Reflections on Some Recent Catholic Claims for Delayed Hominization," *Theological Studies* 56 (1995): 743–763; Stephen Heaney, "Aquinas on the Presence of the Human Rational Soul in the Early Embryo," *Thomist* 56 (1992): 19–48; R. Gerber, "When Is the Human Soul Infused?" *Laval Theologique et Philosophique* 22 (1966): 234–247.

¹⁷ Nicholas Tonti-Filippini, "The Embryo Rescue Debate," *National Catholic Bioethics Quarterly* 3 (2003): 116.

¹⁸ *Ibid.*, 134–135.

¹⁹ *Ibid.*, 134.

²⁰ *Ibid.*, 135.

²¹ *Ibid.*, 134.

²² Norman Ford, *When Did I Begin? Concept of the Human Individual in History, Philosophy and Science* (New York: Cambridge University Press, 1988), 92–93.

²³ Stephen S. Hanson, "More on Respect for Embryos and Potentiality: Does Respect for Embryos Entail Respect for In Vitro Embryos?" *Theoretical Medicine and Bioethics* 27 (2006): 219–220.

²⁴ This subsection is derived from Eberl, "Aquinas's Account of Human Embryogenesis."

²⁵ See Robert Pasnau, *Thomas Aquinas on Human Nature* (New York: Cambridge University Press, 2002), 115.

²⁶ See Norman Kretzmann, *The Metaphysics of Creation: Aquinas's Natural Theology in Summa contra Gentiles II* (Oxford: Clarendon Press, 1999), 39.

²⁷ See Noam Chomsky, *Language and Mind* (New York: Harcourt, Brace & World, 1968); Steven Pinker, *The Language Instinct* (New York: Harper Collins, 1994).

²⁸ For further elucidation of this distinction in types of active potentiality, sometimes construed as "proximate" versus "remote" active potentiality, see Patrick Lee and Robert P. George, *Body-Self Dualism in Contemporary Ethics and Politics* (New York: Cambridge University Press, 2008), 136–138; Alfonso Gómez-Lobo, "On Potentiality and Respect for Embryos: A Reply to Mary Mahowald," *Theoretical Medicine and Bioethics* 26 (2005): 109; Stephen Schwarz, "Personhood Begins at Conception," in *The Abortion Controversy 25 Years After Roe v. Wade: A Reader*, eds. Louis P. Pojman and Francis J. Beckwith (Belmont, CA: Wadsworth, 1998), 265–266; Mark

Johnson, "Quaestio Disputata: Delayed Hominization—A Rejoinder to Thomas Shannon," *Theological Studies* 58 (1997): 711–712; Massimo Reichlin, "The Argument from Potential: A Reappraisal" *Bioethics* 11 (1997): 15; Robert E. Joyce, "Personhood and the Conception Event," *New Scholasticism* 52 (1978): 99–100; Francis C. Wade, "Potentiality in the Abortion Discussion," *Review of Metaphysics* 29 (1975): 249.

²⁹ See Eleonore Stump, *Aquinas* (New York: Routledge, 2003), 46.

³⁰ By "specific and numerical identity," I mean that something not only ceases to be the same *individual*, but also the same *kind* of thing—e.g., something changes from being a non-person to being a person.

³¹ See Charlotte Witt, "Powers and Possibilities: Aristotle vs. the Megarians," *Proceedings of the Boston Area Colloquium in Ancient Philosophy* 11 (1995): 264.

³² See Russell DiSilvestro, "Not Every Cell Is Sacred: A Reply to Charo," *Bioethics* 20 (2006): 149; Roy W. Perrett, "Taking Life and the Argument from Potentiality," *Midwest Studies in Philosophy* 24 (2000): 189; David B. Hershenov, "The Problem of Potentiality," *Public Affairs Quarterly* 13 (1999): 265; Reichlin "The Argument from Potential," 4; Michael B. Burke, "Sortal Essentialism and the Potentiality Principle," *Review of Metaphysics* 49 (1996): 497–500; Patrick Lee, *Abortion and Unborn Human Life* (Washington, D.C.: Catholic University of America Press, 1996), 26–28; Edward Covey, "Physical Possibility and Potentiality in Ethics," *American Philosophical Quarterly* 28 (1991): 239; Peter van Inwagen, *Material Beings* (Ithaca, NY: Cornell University Press, 1990), 151–152; Stephen Buckle, "Arguing from Potential," *Bioethics* 2 (1988): 233–234, 236–238; Norman M. Ford, *When Did I Begin?* 84–85, 109–110; Jim Stone, "Why Potentiality Matters," *Canadian Journal of Philosophy* 17 (1987): 816–818.

³³ For a similar argument based on the concept of "sortal essentialism," see Burke, "Sortal Essentialism and the Potentiality Principle."

³⁴ If an in vitro embryo is not implanted in a uterus, its development will cease after approximately fourteen days and—if it is not cryopreserved before then—it will die. While failure of uterine implantation would result in the embryo's intrinsic active potentiality for further development to not be actualized, it does not count against the embryo possessing such potentiality in the first place—otherwise, it would not begin to develop initially after fertilization.

³⁵ For further explication of Aquinas's metaphysical account of human death and resurrection, see Jason T. Eberl, "A Thomistic Understanding of Human Death," *Bioethics* 19 (2005): 29–48; idem, "The Metaphysics of Resurrection: Issues of Identity in Thomas Aquinas," *Proceedings of the American Catholic Philosophical Association* 74 (2000): 215–230; idem, "Do Human Persons Persist between Death and Resurrection?" in *Metaphysics and God: Essays in Honor of Eleonore Stump*, ed. Kevin Timpe (New York: Routledge, 2009).

³⁶ Luper's term capacity here is best understood in terms of the concept of *natural potentiality* described previously.

³⁷ Steven Luper, *The Philosophy of Death* (New York: Cambridge University Press, 2009), 44–45.

³⁸ See Aquinas, *Summa theologiae* I, q. 29, a. 1.

³⁹ See *ibid.*, I, q. 29, a.3.

⁴⁰ See *ibid.*, I-II, q. 94, a. 2; John Finnis, *Natural Law and Natural Rights* (Oxford: Clarendon Press, 1980), 86.

⁴¹ Arguably, a *positive* moral duty to "promote" life (and health) as a fundamental good follows from Thomistic natural law theory as well; see Jason T. Eberl, Eleanor K. Kinney, and Matthew J. Williams, "Foundation for a Natural Right to Health Care," *Journal of Medicine and Philosophy* 36 (2011): 537–557. Such a moral duty, while imperfect, nevertheless merits serious consideration and supports the *adoptive rescue* of cryopreserved embryos; see Brandon P. Brown and Jason T. Eberl, "Ethical Considerations in Defense of Embryo Adoption," in *The Ethics of Embryo Adoption and the Catholic Tradition*, eds. Sarah-Vaughan Brakman and Darlene F. Weaver (Dordrecht: Springer, 2007).

⁴² See Jason T. Eberl, *Thomistic Principles and Bioethics* (New York: Routledge, 2006), 65–78.